December 10, 1874.

JOSEPH DALTON HOOKER, C.B., President, in the Chair.

The President announced that he had appointed as Vice-Presidents:—

The Treasurer.
The Duke of Devonshire.
Mr. John Evans.
Right Hon. Lyon Playfair.
Dr. Sanderson.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read:—

I. "On the Development of the Teeth of the Newt, the Frog, and certain Lizards." By Charles S. Tomes, M.A. Communicated by John Tomes, F.R.S. Received July 23, 1874.

(Abstract.)

That the "papillary stage" of tooth-development could not be said to at any time exist either in the frog or in certain fish, was pointed out nearly twenty years ago by Professor Huxley, who, however, accepted, on the authority of Goodsir, the latter's theory of the process as true of Man and Mammalia. In more recent years Kölliker and Waldeyer have traced out the course of the development of teeth with great accuracy in Man and some other Mammalia, with the result of showing that the usually accepted views propounded by Goodsir and Arnold are not by any means an accurate representation of what takes place in them.

Since the date of the publication of Professor Huxley's paper, I am not aware that any thing has been published bearing upon the development of the teeth of Reptilia and Batrachia, save a paper by Dr. Lionel Beale upon the development of the teeth of the Newt, and a short and inconclusive paper by Santi Sirena; with the exception of the papers alluded to, the subject may be taken to stand in the position which it occupied at the time of the publication of Professor Owen's 'Odontography,' in which we are told that the teeth-germs of Reptiles and Batrachia never stop at the papillary stage, but that the primitive dental papilla sinks into the substance of the gum and becomes inclosed by a capsule.

The principal facts which my observations enable me to state are:—

That there is no such thing as a "dental groove" or "dental fissure" in the Batrachia and Sauria, but that the whole process takes place beneath an unbroken surface of epithelium.

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That there is no such thing as a stage of "free papillæ," and consequently no sinking of papillæ into the gum and subsequent encapsulation of the same.

Instead of being formed in a "dental groove" the teeth are developed in a region which may be termed the area of tooth-development, varying in form and extent in different Reptilia, but agreeing in all in possessing the following characters:—

It is bounded on the one side by the teeth in place and the parapet of bone which carries them, and on the other, or inner, side by an exceedingly sharply defined boundary, consisting of dense connective tissue. At the surface, near where the functional tooth projects above the oral epithelium, it is narrow, but it expands as it passes more deeply below the surface. Within this area are developing tooth-sacs of different ages, the interspaces being occupied with a loose areolar tissue, differing in appearance from that which is seen outside the area, and appearing to be derived from portions of older tooth-sacs, which have not been entirely used up in the formation of the teeth.

The individual tooth-sacs are formed thus: an inflection of the cells of the oral epithelium, in section like a tubular gland, passes down along the inner side of the area above defined, until it reaches nearly to the level of the floor of the area. The depth to which it penetrates is considerable in many forms, *e. g.* in the Lizards, in which, therefore, this double layer of epithelial cells appears a mere line.

At the bottom of this inflection of epithelial cells the adjacent tissue assumes the form of a small eminence (without at first any visible structural alteration), while the epithelial process takes the shape of a bell-like cap over the eminence.

This epithelial inflection then goes to form the enamel-organ; the eminence becomes the dentine-organ.

Thus the enamel-germ is the first thing recognizable, and the presence of this ingrowth of epithelial cells seems to determine the formation of a dentine-organ at that particular spot which lies beneath its termination.

The enamel-organs, after they are fully formed, retain a connexion with epithelial cells, external to the ovoid or spherical tooth-sacs, at their summits; and the enamel-organs of successive teeth appear to be derived from the necks of those of their predecessors rather than from fresh inflections from the surface of the oral epithelium, though I am not sure that this is, in all instances, the case.

The tooth-sac of the newt is entirely cellular, and has no special investment or capsule; under pressure it breaks up and nothing but cells remain, as was noted by Dr. Lionel Beale.

That of the frog has an investment, derived in the main from what may be called the accidental condensation of the surrounding connective tissue, which is pushed out of the way as it grows; while in the lizard the base of the dentine-germ furnishes lateral prolongations, just as has been observed to be the case in man.

The dentine-organs conform closely with those of mammals; the odontoblast layer is very distinct, and the processes passing from these cells into the dentine-tubes are often visible.

The enamel-organs consist only of the outer and inner epithelia, without any stellate intermediate tissue; as, in some instances, enamel is certainly formed, the existence of the stellate tissue is obviously nonessential. When a tooth is moving to displace its predecessor, its sac travels with it, remaining intact until the actual attachment of the tooth to the bone by ankylosis.

II. "On the Structure and Development of the Teeth of Ophidia." By Charles T. Tomes, M.A. Communicated by John Tomes, F.R.S. Received October 5, 1874.

(Abstract.)

Contrary to the opinion expressed by Professor Owen and endorsed by Giebel and all subsequent writers, the author finds that there is no cementum upon the teeth of snakes, the tissue which has been so named proving, both from a study of its physical characters and, yet more conclusively, from its development, to be enamel. The generalization that the teeth of all reptiles consist of dentine and cement, to which is occasionally added enamel, must hence be abandoned.

Without as yet pledging himself to the following opinion, the author believes that in the class of Reptiles the presence of cementum will be found associated with the implantation of the teeth in more or less complete sockets, as in the Crocodiles and Ichthyosaurs.

The tooth-germs of Ophidia consist of a conical dentine-germ, resembling in all save its shape that of other animals, of an enamel-organ, and of a feebly expressed capsule, derived mainly from the condensation of the surrounding connective tissue.

The enamel-organ consists only of a layer of enamel-cells, forming a very regular columnar epithelium, and of a few compressed cells external to this, hardly amounting to a distinct layer; the enamel-organ is coextensive with the dentine-germ. There is no stellate reticulum separating the outer and inner epithelia of the enamel-organ.

The successional teeth are very numerous, no less than seven being often seen in a single section; and their arrangement is peculiar, and quite characteristic of the Ophidia.

The tooth next in order of succession is to be found at the inner side of the base of the tooth in place, where it lies nearly horizontally; but the others stand more nearly vertically, parallel with the jaw and with the tooth in place, the youngest of the series being at the bottom.